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United States
Department of
Agriculture

Animal and
Plant Health
Inspection
Service

Veterinary
Services

Selenium and the Preweaned Heifer

National Animal Health Monitoring System

A low proportion of U.S. dairy herds have deficient blood selenium levels in preweaned calves, though levels vary by region and season.

Selenium is one of 14 trace elements essential to the growth and maintenance of healthy calves. Prior to the 1960's, selenium was known only for its toxic effects on cattle grazing on plants that accumulated selenium. Since then, research has linked disease conditions, such as white muscle disease and unthriftiness in preweaned calves, with selenium deficiency. Forages grown in regions with high selenium soil levels usually have adequate levels of the element. Feeding rations based on forages grown in regions with selenium-deficient soil, however, may result in selenium deficiency.

Testing preweaned heifers for whole blood selenium level was part of a 1991-1992 study by the United States Department of Agriculture's National Animal Health Monitoring System (USDA:APHIS: Veterinary Services). Herds participating in the National Dairy Heifer Evaluation Project (NDHEP), a study of heifer health and management, represented 78 percent of the National dairy cow population.

Figure 1 shows that 93.6 percent of the dairy operations have average calf selenium levels from .09 to .42 parts per million (ppm) which are considered adequate. An additional 2.9 percent of operations show subclinically deficient levels of .06-.08 ppm, and 3.4 percent have severely deficient levels at .05 or less.

Figure 2 shows the results by geographical region. Total percent of herds with adequate results range from 92.2 in the Great Lakes region to 97.9 in the plains states. Plains states have fewer severely and subclinically deficient herds than other regions (a total of 2.1 percent), which may be related to soil selenium levels.

Figure 1. Mean Selenium Values of Preweaned Heifers on U.S. Dairy Operations

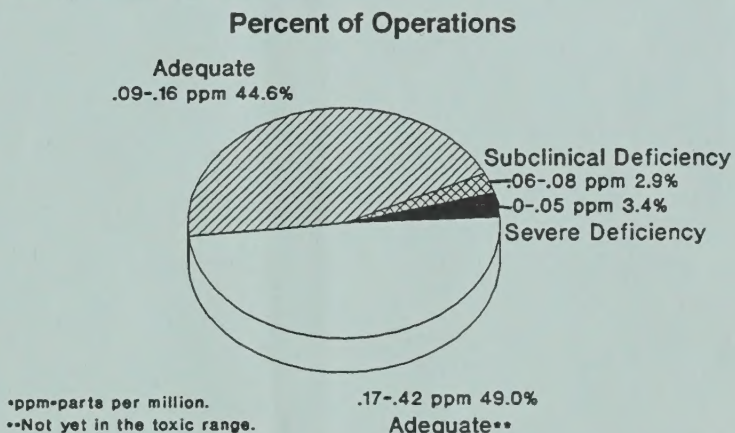
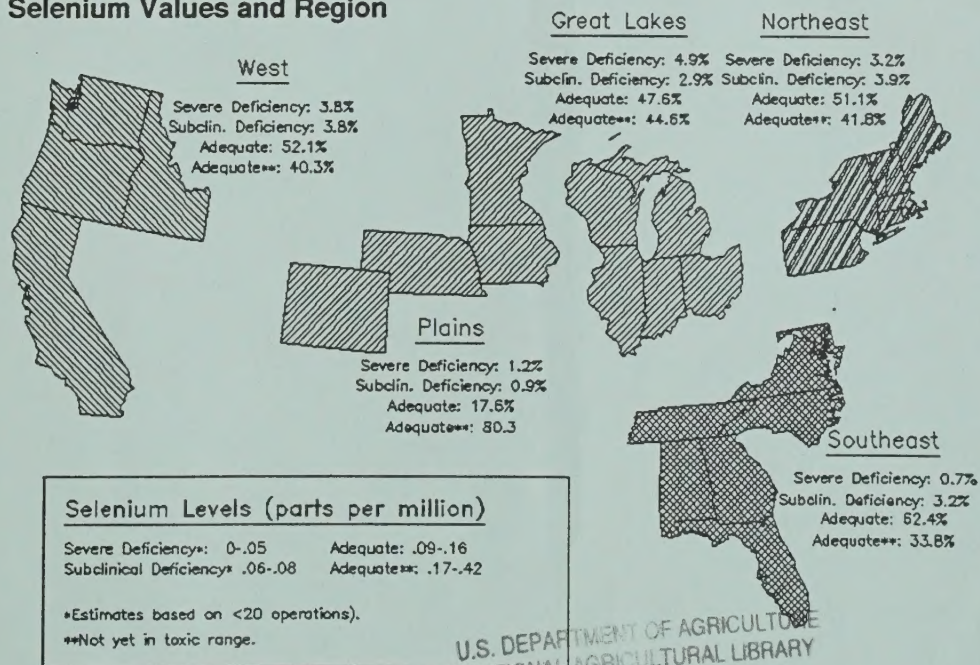


Figure 2. Percent of Operations by Average Preweaned Dairy Heifer Selenium Values and Region



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Percent of operations with severely deficient calf selenium levels is lowest in spring and peaks in the fall at 10.5 percent (Figure 3). Herd percentages with deficient levels range from 15.8 percent in the fall to 1.5 percent in the winter. Selenium blood levels of preweaned calves are reflections of their dams' selenium status (the median age of heifers tested was 32 days) which may be impacted by selenium supplementation. Calf results may also have been impacted by use of selenium-containing milk replacers.

Regionally, from 19.4 to 45.4 percent of producers provide heifers from breeding to calving with selenium supplementation in feed (Figure 4). Supplementation by injection is less common, ranging from 4.0 to 10.4 percent of producers in each region.

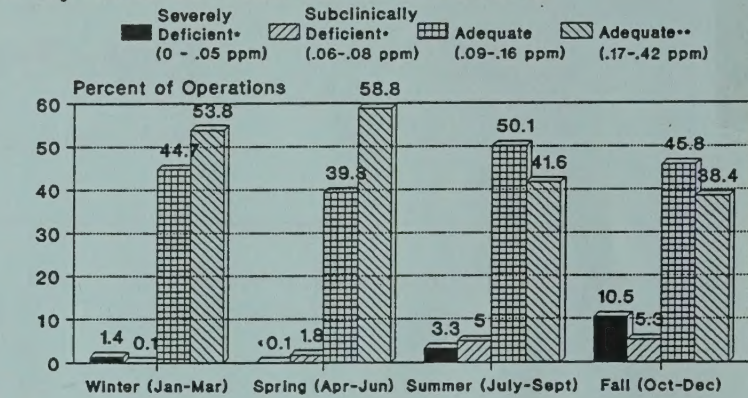
NDHEP results associated supplementing heifers from breeding to calving age with injectable selenium with an increased average herd selenium level in preweaned heifer calves (Figure 5). Percent of herds deficient and marginally deficient totalled 1.7 for those using injection supplementation and 6.7 for those who did not. Results indicated no clear association between supplementing selenium in feed for heifers from breeding to calving and selenium levels of preweaned calves.

Over 1,811 farms in 28 states were selected to represent herds of 30 or more cows for the NDHEP. Blood samples from 6,336 preweaned heifer calves (an average of 5.7 calves per herd) from 1,095 farms were tested for selenium level. Measurements of the whole-blood selenium levels for the NDHEP were performed by the National Veterinary Services Laboratories (NVSL), also of the USDA:APHIS:VS.

Researchers will continue to use the results of the NDHEP selenium assessment to determine association of selenium with calf diseases and health conditions. 🐄

Participants in the NDHEP also included the National Agricultural Statistics Service (USDA) and State and Federal Veterinary Medical Officers. The Cooperative Extension Service provided editorial assistance. For more information on National Dairy Heifer Evaluation Project and other NAHMS programs, please contact:

Figure 3. Percent of Operations by Average Preweaned Dairy Heifer Selenium Values and Season



*Estimates for severely deficient and subclinically deficient were based on <20 operation
**Still not in toxic range.

Figure 4. Percent of Operations Using Selenium Supplementation for Dairy Heifers from Breeding to Calving by Region

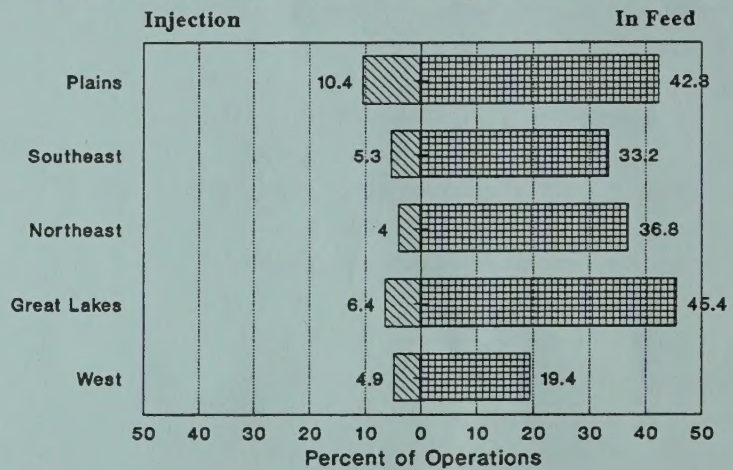
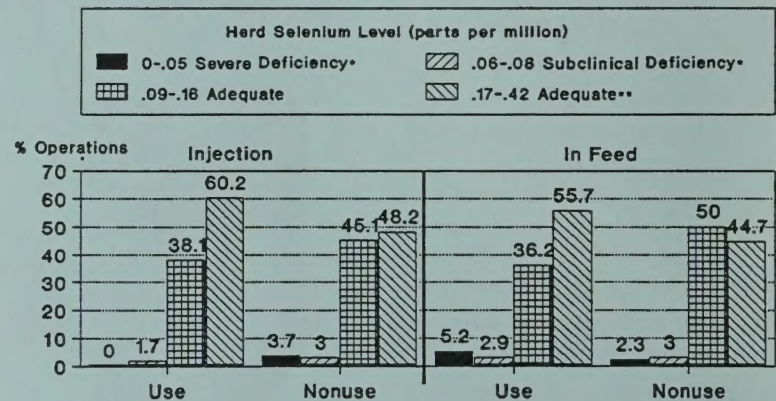


Figure 5. Percent of Operations by Average Herd Selenium Values by Type of Supplementation



*Estimates for deficient and marginally deficient were based on <20 operations.
**Still not in toxic range.

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